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CHAPTER 19

Re-using (Nearly) Depleted Oil and Gas Fields in the North Sea for CO_2 Storage: Seizing or Missing a Window of Opportunity?

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1 Introduction*

Carbon Capture and Storage (CCS) involves the capture of carbon dioxide (CO_2), the transport and injection and subsequent permanent storage into suitable geological formations.[1] According to the European Commission, CCS is a major instrument in view of the transition to a full low-carbon economy, as CO_2 storage can balance conflicting interests of increasing energy demands and thus continued reliance on fossil fuels on the hand and the need to reduce greenhouse gas emissions into the atmosphere on the other hand.[2]

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1 Intergovernmental Panel on Climate Change, *IPCC Special Report on Carbon Dioxide Capture and Storage. Prepared by Working Group III of the Intergovernmental Panel on Climate Change* [B. Metz and others eds] (Cambridge University Press 2005) 54 <www.ipcc.ch/pdf/special-reports/srccs/srccs_wholereport.pdf>.

2 European Commission, 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the Future of Carbon Capture and Storage in Europe', Brussels, 27.03.2013, COM (2013) 180 final, 3; European Commission, Communication from the Commission to the European Parliament and others, 'A Clean Planet for all A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy', Brussels, 28.11.2018 COM(2018) 773 final, 15; L. Helman, G. Parchomovsky and E. Stavang, 'Dynamic Regulation and Technological Competition: A New Legal Approach to Carbon Capture and Storage' in D.N. Zillman and others (eds), *The Law of Energy Underground: Understanding New Developments in Subsurface Production, Transmission, and Storage* (Oxford University Press 2014) 296.

CO_2 can be stored in different kinds of reservoirs such as aquifers and depleted oil and gas fields.[3] This chapter looks into the re-use of depleted oil and gas fields for the purpose of CO_2 storage.[4] Since CO_2 storage onshore is met by fierce public opposition,[5] offshore storage is currently considered as the main option in Europe. Below the focus will therefore be on CO_2 storage in (nearly) depleted reservoirs offshore. We will in particular concentrate on the North Sea as this area has the largest storage capacity in Europe and a suitable geology for the purpose of CO_2 storage.[6] Because this offshore area is characterized by large scale oil and gas exploitation,[7] it also has the potential for reusing these fields for CO_2 storage. Depending on the size and location of these reservoirs, it may even be necessary to decide that CO_2 storage will require a coordinated approach and turn several depleted reservoirs into CO_2 storage facilities at the same time.[8] CO_2 storage on the Dutch continental shelf may, for example, rely on clustering several reservoirs given their relatively small size.[9] In order to form an adequate cluster, these reservoirs have to be

3 See: IPCC (n 1) 94. Depleted offshore oil and gas fields are important for CO_2 storage due to their geophysical features, the years of experience in exploiting them and the presence of suitable infrastructure that could be reused: IPCC (n 1) 215.

4 This reuse involves the transition of an exploitation permit to a storage permit and scaling up in terms of infrastructure: EBN & Gasunie, 'CO_2 transport- en opslagstrategie' (EBN/Gasunie Advies 2010) 11 <www.ebn.nl/ebn-publicaties/overige-publicaties> accessed 17 October 2015 (Dutch only).

Storage sites can only be operated provided there is a storage permit: Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC (CCS Directive) [2009] OJ L140/114, art 6(1).

5 See for example: COM (2013) 180 final (n 2) 18. Also: M. Pragnell, 'Communications for Carbon Capture and Storage: Identifying the benefits, managing risks and maintaining the trust of stakeholders' (supported by Global CCS Institute 2013) 12–13 <http://hub.globalccsinstitute.com/sites/default/files/publications/92266/communications-carbon-capture-storage.pdf>.

6 Scottish Carbon Capture & Storage (SCCS), *SCCS Recommendations and Conference 2013 Report. Unlocking North Sea CO_2 Storage for Europe: Practical actions for the next five years* (SCCS 2013) 10–11 < www.sccs.org.uk/images/expertise/reports/unlocking/downloads/SCCSConference2013Report.pdf >.

According to the European Commission, storage capacity in the North Sea has been estimated at over 200 gigatonnes of CO_2: COM (2013) 180 final (n 2) 18.

7 <http://euoag.jrc.ec.europa.eu/node/63>.

8 See also chapter 17 of this book, N. Bankes, 'The use of sub-seabed transboundary geological formations for the disposal of carbon dioxide'

9 DHV and TNO (commissioned by NOGEPA and Dutch Ministry of Economic Affairs), 'Potential for CO_2 storage in depleted gas fields on the Dutch Continental Shelf. Phase 1:

situated in close proximity to each other.[10] Even if these reservoirs are located in close proximity to each other it does not necessarily mean that they will reach a state of near depletion at the same time. This raises issues with regard to existing abandonment and removal obligations. Is it possible to keep offshore installations in place instead or removing them with the aim of re-using the reservoirs and installations for CO_2 storage on a later stage?

In order to answer the question whether infrastructure can be kept in place with the aim of reusing it at a later stage for CO_2 storage, it needs to be assessed whether States can allow for offshore installations not being removed after production has ceased. For this purpose, we will first consider in Section 2 the position of coastal States under international law and in particular the Law of the Sea as the latter provides for the legal basis for developing energy activities offshore. In Section 3, we will then examine how some coastal States have implemented these principles of international law in their national jurisdictions. We will particularly examine the regimes in the Netherlands, the United Kingdom (UK) and Norway. Subsequently Section 4 will discuss some specific challenges and possible solutions with regard to the reuse of depleted and abandoned fields and infrastructure. Finally, Section 5 will provide some concluding remarks.

2 The Exercise of State Jurisdiction Offshore

2.1 *Introduction*

Historically, the use of the sea was unrestricted and open to all mankind.[11] The jurisdiction of States and the rights to issue and enforce legislation was in principle limited to the territory of States. This situation changed when due to technical developments it became possible to produce oil offshore.[12] In order to deal with offshore claims the 1958 United Nations Convention on the Continental Shelf provided for the concept of a continental shelf (CS) and the subsequent right of coastal states' functional jurisdiction with regard to the exploration and exploitation of oil and gas on the continental shelf.[13] The

technical assessment' (June 2008) 31, 44 <www.nlog.nl/resources/StorageCO2/DHV_TNO_CCS_offshore_%20final_30_06_08.pdf>.

10 DHV and TNO (n 9) 44.

11 See the concept of 'Mare Librum' as issued by Hugo de Groot in 1609.

12 See Truman Proclamation.

13 United Nations, Convention on the Continental Shelf. Done at Geneva, on 29 April 1958, no. 7302. United Nations –Treaty Series 1964 Vol. 499, 311–354 <https://treaties.un.org/doc/Publication/UNTS/Volume%20499/volume-499-I-7302-English.pdf>.

1982 United Nations Conventions on the Law of the Sea (UNCLOS)[14] provided coastal States with the possibility to claim an additional maritime zone – an exclusive economic zone or EEZ – and thus additional rights as regards the production of energy from other sources like waves and other economic activities.[15]

Whereas States have sovereignty and thus full jurisdiction on their territory (including the territorial sea),[16] their jurisdiction is limited on the CS and in the EEZ to economic activities such as the exploration for and the production of oil and gas. Coastal States may thus issue legislation governing these activities offshore. Although UNCLOS does not specifically refer to carbon storage it is generally assumed that this activity also is part of a coastal State's functional jurisdiction, either on the basis of the regime governing the continental shelf or the regime governing the EEZ.[17]

2.2 *Jurisdiction under UNCLOS*

It follows from the above that coastal States have sovereign rights in the EEZ[18] and on the CS[19] and thus a functional jurisdiction for the purpose of the exploration and exploitation of natural resources.[20] To be able to exercise these rights, coastal States have the right to make use of the seabed and to establish

14 United Nations, Convention on the Law of the Sea. Concluded at Montego Bay on 10 December 1982, no. 31363. United Nations – Treaty Series 1994 Vol. 1833, 396–581. <https://treaties.un.org/doc/Publication/UNTS/Volume%201833/volume-1833-A-31363-English.pdf>.

15 The 1958 UN Convention on the Continental Shelf and UNCLOS have been signed and ratified by the North Sea States. Currently UNCLOS is the main legal basis for developing activities offshore. See also M. Brus, 'Challenging Complexities of CCS in Public International Law' in M.M. Roggenkamp and E. Woerdman (eds), *Legal Design of Carbon Capture and Storage. Developments in the Netherlands from an International and EU Perspective* (Intersentia 2009) 29.

16 UNCLOS (n 13), art 2(1), (2) and art 3.

17 Brus (n 15) 29.

18 The EEZ is an area beyond and adjacent to the territorial sea, which shall not extend beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured: UNCLOS (n 14), arts 55, 57. An EEZ has to be declared by a coastal State.

19 UNCLOS (n 14), art 76(1): The CS of a coastal State comprises the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance.

20 UNCLOS (n 14), art 56(1)(a) (EEZ) and art 77(1) (CS). Natural resources include the mineral and other non-living resources of the seabed and the subsoil: UNCLOS (n 14), art 56(1)(a) (EEZ) and art 77(4) (CS).

as well as use offshore installations.[21] It entails that coastal States have the exclusive right to construct, authorize and regulate the construction, operation and use of all installations necessary for the exploration and production of energy offshore.[22] The functional jurisdiction is extended to those cables and pipelines constructed or used in connection with exploitation of resources.[23]

The functional jurisdiction[24] needs to be balanced with another main principle of UNCLOS: the freedom of fishing, navigation as well as the laying of cables and pipelines. The freedom to use the high sea cannot be restricted more than really necessary. Consequently, when an oil or gas production ceases, installations necessary for its production need to be removed. The extent to which these installations have to be removed has been a matter of discussion since the 1980s. Below we will examine the removal obligations applying to offshore installations – e.g. reservoirs, wells, platforms and subsea facilities – and offshore pipelines as these obligations are crucial when assessing a possible reuse for the purpose of CO_2 storage.[25]

2.3 *Removal of Offshore Installations*

2.3.1 International Legal Framework

Under the regime of the 1958 Convention on the Continental Shelf abandoned or disused offshore installations located on the CS had to be removed entirely.[26] The introduction of UNCLOS in 1982 has limited this obligation as it now generally provides for the removal of abandoned or disused installations without requiring complete removal.[27] It therefore facilitates a partial removal of installations, and 'appropriate publicity shall be given to the depth, position and dimensions of any installations not entirely removed'.[28] UNCLOS does

21 UNCLOS (n 14), art 56(1)(b)(i), 60(2) (EEZ).

22 UNCLOS (n 14), arts 60(1)(b), 56(1)(a) (EEZ) and arts 80, 60(1)(b), 56(1)(a) (CS).

23 UNCLOS (n 14), arts 56(3), 79(4) (EEZ) and art 79(4) (CS).

24 H.K. Müller and M.M. Roggenkamp, 'Regulating Offshore Energy Sources in the North Sea- Reinventing the Wheel or a Need for More Coordination?' [2014] The International Journal of Marine and Coastal Law 716, 718.

25 See further IEAGHG, 'Re-use of Oil & Gas Facilities for CO_2 Transport and Storage', 2018/06, July 2018.

26 United Nations, Convention on the Continental Shelf. Done at Geneva, on 29 April 1958, no. 7302. United Nations –Treaty Series 1964 Vol. 499, 311–354, art 5(5) <https://treaties.un.org/doc/Publication/UNTS/Volume%20499/volume-499-I-7302-English.pdf >.

27 UNCLOS (n 14), arts 80, 60(3) (CS).

28 Also: R. Beckman, 'Global Legal Regime on the Decommissioning of Offshore Installations and Structures' in M.H. Nordquist (ed), *The Regulation of Continental Shelf Development. Rethinking International Standards* (Nijhoff 2013) 263; C. Redgwell, 'International Regulation of Energy Activities' in M.M. Roggenkamp and others (eds), *Energy Law in Europe. National, EU and International Regulation* (Oxford University Press 2007) 65.

not provide any detailed rules as to when and how these installations have to be removed. It merely states that coastal States have to take into account 'any generally accepted international standards established by the competent international organization',[29] which in this case is the International Maritime Organization (IMO).[30] In 1989, the Assembly of the IMO adopted Guidelines and Standards for the removal of offshore installations on the CS and in the EEZ (IMO Guidelines).[31]

Starting-point of the IMO Guidelines is the obligation to remove abandoned and/or disused installations.[32] Entire removal is explicitly required if the offshore installations are located in shallow waters.[33] However, the IMO Guidelines also provide possibilities to allow for non- or partial removal of installations,[34] in which case the IMO has to be notified of the decision.[35] An exemption from the removal obligation would, for example, be possible if the existing installation (or part thereof) will serve a new purpose.[36] At first glance, this possibility could be relevant for reusing installations for the purpose of CO_2 storage. However, the IMO Guidelines are not legally binding[37] and a decision not to remove or partially remove abandoned or unused installations needs to be balanced against the duties stemming from UNCLOS, most particularly the freedom of navigation and fishery. Although coastal States basically are bound by a duty to remove unused offshore installations and thus need to

29 UNCLOS (n 14), art 60(3) (EEZ) and arts 80, 60(3) (CS).

30 'Competent or relevant international organizations under the United Nations Convention on the Law of the Sea' Law of the Sea Bulletin No. 31, 82. <www.un.org/depts/los/doalos_publications/LOSBulletins/bulletinpdf/bulletinE31.pdf>. On the relationship between UNCLOS and the IMO: International Maritime Organization, 'Implications of the United Nations Convention on the Law of the Sea for the International Maritime Organization' (LEG./MISC.7), IMO 19 January 2012). <www.imo.org/OurWork/Legal/Documents/Implications%20of%20UNCLOS%20for%20IMO.pdf>.

31 IMO, Resolution A. 672(16), adopted on 19 October 1989 (Annex: Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone). <www.imo.org/blast/mainframe.asp?topic_id=1026>.

32 IMO Guidelines (n 31), para 1.1.

33 This concerns offshore installations which stand in less than 75 meters of water (100 meters if it has been emplaced on the sea-bed on or after 1 January 1998) and weighs less than 4,000 tonnes in air (IMO Guidelines (n 31), paras 3.1 and 3.2).

34 The non- (or partial) removal has to be consistent with the IMO Guidelines: IMO Guidelines (n 31), para 1.1.

35 IMO Guidelines (n 31), para 1.3.

36 IMO Guidelines (n 31), para 3.4(1).

37 IMO, Resolution A. 672(16) (n 29), point 2. At the same time, the IMO Guidelines need to be taken into consideration by Member Governments: UNCLOS (n 14), art 60(3). Also: Redgwell (n 28) 66.

ensure that removal actually takes place,[38] UNCLOS and the IMO Guidelines also provide some flexibility and as decisions with regard to (partial) removal and the timing of removal are based on a case-by-case evaluation.[39]

2.3.2 What Is an Installation?

According to UNCLOS the removal obligation applies to abandoned and disused installations and structures in order to ensure safety of navigation and will take into account international standards (e.g. IMO Guidelines) and have due regard to fishing, the protection of the marine environment and the rights and duties of other states.[40] It is generally accepted that this obligation applies to all exploration and production platforms. It is not clear whether the removal obligation also applies to abandoned or unused pipelines on the CS or in the EEZ.[41] The wording of UNCLOS indicates that the removal obligation could apply if a pipeline qualifies as an installation or other structure.[42] In the absence of a clear definition in UNCLOS of the terms 'installation' and 'structure', it is generally accepted that a pipeline is not considered as an installation because most provisions of UNCLOS regarding installations do not apply to submarine pipelines. This is, for example, the case with the requirement that coastal states have to establish a safety zone around installations. Such a requirement does not apply to pipelines (and would be difficult to establish). Moreover, UNCLOS explicitly links the need for removal to safety of navigation. Unused pipelines will usually not affect safety of navigation.

Although generally speaking pipelines are not considered as an installation in its own right, it is still possible that some pipelines (and cables) are considered as being part of a (production) installation. In such case the removal obligation applying to installations may extend to some subsea pipelines. We therefore conclude that by virtue of the absence of a directly applicable international legal norm, it is within the competence of the coastal State to determine the legal regime governing the removal of offshore pipelines and

38 IMO Guidelines (n 31), para 1.2.

39 IMO Guidelines (n 31), para 2.1. For the specific conditions: see inter alia IMO Guidelines (n 31), para 2.4. The coastal State also has obligations with regard to the installation, as it should ensure that the legal title to the installation is unambiguous and that responsibility for maintenance and the financial ability to assume liability for future damage are clearly established: IMO Guidelines (n 31), para 3.11.

40 UNCLOS (n 14), art 60(3).

41 M.M. Roggenkamp, *Het juridisch kader van pijpleidingen in de olie- en gasindustrie* (Intersentia 1999) 409.

42 UNCLOS (n 14), art 60(3).

that a distinction needs to be made between different types of pipelines, i.e. pipelines being part of the installation and field-to-shore pipelines.

2.3.3 The Timing of Removal

The next question relevant for our research is when exactly offshore installations have to be removed. The removal obligation applies if an installation is abandoned or disused. UNCLOS does not provide a clear guidance for this purpose. Generally speaking an installation is disused if production has ceased or if a licence to produce has lapsed. However, not any termination of the production activities implies that the installation is disused. Although the IMO Guidelines merely are recommendations,[43] they provide some further guidance in this respect as they refer to 'permanent disuse'. In other words, they seem to indicate that a distinction needs to be made between disuse and permanent disuse.

UNCLOS does neither provide for a specific time frame for any removal of unused installations. Again the IMO Guidelines seem to provide some guidance as they state that the removal should be performed 'as soon as reasonably practicable after abandonment or permanent disuse'.[44] In practice these norms may still prove to be rather vague as different opinions may be held about the term 'reasonable practicable'. When is something reasonable practicable and who decides whether it is reasonable?

This phrasing of UNCLOS therefore seems to leave the possibility for leaving an installation in place after production has ceased with the aim of reusing it on a later stage for carbon storage as in such scenario the permanent disuse of the installation will be postponed after the injection of CO_2 into the reservoir has been completed. Last but not least, disuse of an installation does not mean that the installation is abandoned. As long as an installation is being maintained and an operator is in charge there is no abandonment taking place.

More problematic is the situation when an installation is kept in place for future use (and thus not permanently disused) but at the same time is abandoned as the operator in charge of the production activities is no longer in charge. What is the status of the installation in the period of (temporary disuse) and reuse? To what extent should this situation be considered as constituting illicit disposal under international law, especially in view of the duty of coastal States to adopt laws to prevent, reduce and control pollution of the

43 IMO, Resolution A. 672(16) (n 31), point 2.

44 IMO Guidelines (n 31), para 1.2.

marine environment caused by any source,[45] including dumping.[46] The term 'dumping' refers to any deliberate disposal of offshore installations[47] but does not include 'the leaving wholly or partly in place of a disused offshore installation, provided that any such operation takes place in accordance with any relevant provision of the Convention and with other relevant international law'.[48] A situation where an unused installation is kept in place for future use would therefore not constitute a form of dumping. The dumping conventions applying to the North Sea area do subsequently not apply and will not be discussed in this chapter.

2.4 *The Reuse of Installations*

The above has shown that UNCLOS requires that abandoned or disused installations or structures shall be removed to ensure safety of navigation, taking into account international standards and having due regard to fishing, the protection of the marine environment and the rights and duties of other states. This obligation applies to offshore (production) installations and to those pipelines that are considered part of the installation. As regards the field-to-shore pipelines UNCLOS does not require any removal. Coastal States may thus decide to leave those offshore pipelines that are not part of an installation in situ.

Neither UNCLOS nor the IMO Guidelines impose a clear time frame on the coastal State with regard to the removal of installations. Moreover, the IMO Guidelines seem to imply that coastal States have some discretion as to the timing of the removal and to the possibility of temporarily leaving the installations in situ for purposes of CO_2 storage. Another matter is how coastal States have interpreted these norms. This issue will be discussed below.

3 Functional Jurisdiction and Abandonment Approaches in the North Sea

3.1 *Introduction*

It follows from the above that coastal States have a functional jurisdiction with regard to the exploration for and exploitation of natural resources on the CS and are thus entitled to regulate oil and gas production and subsequently also

45 UNCLOS (n 14), arts 194(1), 194(3).

46 UNCLOS (n 14), arts 194(1), 194(3) and 210(1).

47 Convention for the Protection of the Marine Environment of the North-East Atlantic. Done at Paris, on 22 September 1992, art 1(f)(ii)(i). <http://www.ospar.org/convention/text> accessed 28 October 2015.

48 OSPAR Convention (n 47), art 1(g)(iii)(i).

the construction and removal of all necessary installations. Similarly, we noted that coastal States have generally assumed that their functional jurisdiction on the CS and/or in the EEZ also applies to carbon storage. In this section we will discuss how these principles of jurisdiction have been applied in the North Sea area. Whilst doing so it has to be noted that international law addresses States and States usually are not directly involved in energy production – and carbon storage – but rather transfer those rights to individual companies.

Most coastal States surrounding the North Sea are members of the European Union (EU). Norway is not a member of the EU but party to the European Economic Area (EEA). Based on the EEA Agreement, Norway may be required to implement all relevant EU directives and regulations.[49] Consequently, Norway has implemented both the Hydrocarbons Licensing Directive (Directive 94/22/EC) and the CO_2 Storage Directive (2009/31/EC). These directives provide general rules on EU level for governing exploration and production of hydrocarbons and the possibility of carbon storage. Whereas the Hydrocarbons Licensing Directive does not explicitly refer to the continental shelf and thus assumes that EU Member States have functional jurisdiction, the European legislator apparently wanted to avoid any doubt about the extent of coastal States' jurisdiction as it has included in Directive 2009/31/EC an express provision allowing for CO_2 storage on the continental shelf and in the exclusive economic zone within the meaning of UNCLOS.[50]

The Hydrocarbons Licensing Directive and the CO_2 Storage Directive are both based on an authorization regime. EU Member States may have the right to issue exclusive authorizations for the exploration and production of oil and gas[51] but may also issue exploration permits for selecting suitable storage sites and permits for storing carbon dioxide.[52] It should be noted, however, that the Hydrocarbon Licensing Directive does not include any provisions regarding the closure of reservoirs, the removal of installations and pipelines, nor regarding the possibility of reusing depleted oil and gas fields for storage of carbon dioxide.[53] Neither of these directives nor any other EU legislation specifically applies to the abandonment and removal of offshore oil and gas installations

49 Agreement on the European Economic Area [1994] OJ L 1/3, art 7(b). <www.efta.int/legal-texts/eea>.

50 CCS Directive (n 4), art 2(1) and preamble, recital 18.

51 Directive 94/22/EC, arts 1(3), 3.

52 CCS Directive (n 4), art 1 and 2(1).

53 Also: M.M. Roggenkamp and D.M. Hanema, 'New Uses of the Underground in the Netherlands: How to Manage a Crowded Subsoil?' in D.N. Zillman and others (eds), *The Law of Energy Underground: Understanding New Developments in Subsurface Production, Transmission, and Storage* (Oxford University Press 2014) 375.

and the possible re-use of subsoil areas and installations. In the absence of any guidance at EU level we will therefore focus on the way in which coastal States have dealt with these issues. Below we will thus discuss the national regimes in three North Sea States – the Netherlands, the United Kingdom (UK) and Norway. These States have been mainly selected on account of their significance in offshore oil/gas production[54] and their potential for CO_2 storage.[55] Moreover, all three coastal states also are faced with the need to decommission offshore installations. Despite these similarities there are also some major differences. One of these differences relates to the size of the fields and thus the extent to which it may be necessary to cluster depleted fields in order to develop economically viable CO_2 storage.

Below we will briefly discuss the rules applying to the exploration and production of oil and gas and the storage of carbon dioxide. The main focus will, however, be on the rules governing abandonment and removal of installations and the possibility for re-using these installations for storing CO_2. We will in particular examine the Dutch Mining Act of 2003 (MA 2003)[56] and its

54 In 2013, the primary production of natural gas in the EU amounted to 131.755 kilotonne of oil equivalent (ktoe) and the primary production of crude oil and other hydrocarbons (together) amounted to 72.041 ktoe. In the same year, the Dutch primary production accounted for 61.767 ktoe (natural gas) and 2.192 ktoe (crude oil and other hydrocarbons), whereas the UK primary production was 32.870 ktoe (natural gas) and 41.921 ktoe (crude oil and other hydrocarbons). In Norway, the primary production in 2013 accounted for 95.602 ktoe (natural gas) and 84 932 (crude oil and other hydrocarbons). Eurostat, *Energy balance sheets 2013 data* (Eurostat 2015) 9 (EU), 49 (Netherlands), 67 (UK), Norway (69) <http://ec.europa.eu/eurostat/web/products-statistical-books/-/KS-EN-15-001>. General information on offshore oil and gas production in the European Union/North Sea is available through: <http://euoag.jrc.ec.europa.eu/node/63>.

55 The Netherlands: see DHV and TNO (n 9). The UK: see UK Department of Energy and Climate Change (DECC), 'CCS Roadmap. Storage strategy' (URN 12D/016d, DECC April 2012) <www.gov.uk/government/uploads/system/uploads/attachment_data/file/48320/4904-ccs-roadmap–storage-strategy.pdf>. Norway has extensive experience with regard to CO_2 storage: Norwegian Petroleum Directorate, 'CO_2 Storage Atlas Norwegian North Sea' (2011) 6 <www.npd.no/Global/Norsk/3-Publikasjoner/Rapporter/PDF/CO2-ATLAS-lav.pdf>.

56 Mining Act 2003. Dutch: *Wet van 31 oktober 2002, houdende regels met betrekking tot het onderzoek naar en het winnen van delfstoffen en met betrekking tot met de mijnbouw verwante activiteiten* (Act of 31 October 2002, regarding regulations concerning the exploration for and the production of minerals and concerning mining related activities), *Staatsblad* 14 November 2002, number 542 (Dutch). A (non-authoritative) translation of this Act in English: <http://nlog.nl/en/legal/legislation.html>.

accompanying Mining Decree[57] and Mining Regulation,[58] the UK Petroleum Act 1998 (PA 1998)[59] and the Guidance Notes[60] as well as the Norwegian Petroleum Act 1996 (PA 1996) and the accompanying Petroleum Regulations 1997 (PR 1997).[61]

3.2 *The Netherlands*

In the Netherlands the Minister of Economic Affairs and Climate (MEA) is entitled to award oil and gas exploration and/or production licences as well as CO_2 storage licences on a competitive basis.[62] Exploration and production licences are usually applied for by and awarded to joint ventures for a specific period of time. The joint venture parties appoint an operator that needs to be approved by the MEA.[63] The State participant – EBN – will usually participate financially via an agreement of cooperation.[64] When awarding a licence the MEA may require the licensee for a financial security in order to ensure that abandonment and removal costs can be paid for.[65] So far the MEA has not made use of this possibility.

57 Mining Decree. Dutch: *Besluit van 6 december 2002, houdende regels ter uitvoering van de Mijnbouwwet* (Decree of 6 December 2002, regarding regulations to implement the Mining Act), *Staatsblad* 2002, number 604 (Dutch). A (non-authoritative) translation of the Mining Decree in English: <http://nlog.nl/en/legal/legislation.html>.

58 Mining Regulation. Dutch: *Mijnbouwregeling, Staatscourant* 16 December 2002, number 245 (Dutch). A (non-authoritative) translation of this Regulation in English: <http://nlog.nl/en/legal/legislation.html>.

59 Petroleum Act 1998, c 17. An Act to consolidate certain enactments about petroleum, offshore installations and submarine pipelines <www.legislation.gov.uk/ukpga/1998/17/contents>.

60 Department of Energy and Climate Change, 'Guidance Notes. Decommissioning of Offshore Oil and Gas Installations and Pipelines under the Petroleum Act 1998' (DECC Guidance Notes), <www.gov.uk/oil-and-gas-decommissioning-of-offshore-installations-and-pipelines>.

61 Petroleum Act 1996. Norwegian: *Lov om petroleumsvirksomhet* (Petroleum Act), <https://lovdata.no/dokument/NL/lov/1996-11-29-72>. A non-authoritative translation of the Act in English can be consulted at: <www.npd.no/en/Regulations/Acts/Petroleum-activities-act/>. Petroleum Regulations 1997. Norwegian: Norwegian: *Forskrift til lov om petroleumsvirksomhet* (Petroleum Regulations). Sections 10 till 18 NO PA 1996 provide the legal bases of these Regulations. <https://lovdata.no/dokument/SF/forskrift/1997-06-27-653>. A non-authoritative translation of the Regulations in English can be consulted at: <www.npd.no/en/Regulations/Regulations/Petroleum-activities/>.

62 MA 2003 (n 56), arts 6 and 31b–32. So far, the Ministry has awarded one CO_2 storage permit.

63 M.M. Roggenkamp 'Energy Law in the Netherlands' in M.M. Roggenkamp and others (eds), *Energy Law in Europe. National, EU and International Regulation* (Oxford University Press, forthcoming in 2016).

64 M.M. Roggenkamp 'Energy Law in the Netherlands' (n 63).

65 MA 2003 (n 56), art 47.

The MA 2003 explicitly provides that 'a mining installation that is no longer in use has to be removed'.[66] As the Dutch CS has shallow waters with an average water depth of 35 meters, rising to well over 60 meters in the northern parts,[67] these installations will in accordance with the IMO Guidelines be removed entirely.[68] So far, approximately 2,000 wells (both onshore and offshore) have been abandoned, 23 platforms removed – with some 150 platforms remaining – and some 200 km pipelines decommissioned.[69]

The closure, abandonment and removal of offshore installations are subject to an abandonment and removal plan, which is issued by the operator.[70] This plan needs at least to describe the way in which the installation, debris and other matter will be removed[71] as well as their final destination,[72] and the timing of the involved activities.[73] The removal plan has to be send to the MEA for approval.[74] The MEA can only refuse his consent in case of risk of potential damages.[75] Although neither the MA nor the Mining Decree provides for a time limit for actual removal, the Minister has the right to set such a time limit.[76] This provision allows the MEA to force the (former) licensee[77] to remove the installation.[78] By doing so the State passes on to the (former) licensees the obligation to remove unused offshore installations.

66 MA 2003 (n 56), art 44(1). MA 2003 (n 56), art 1(0) refers to the term mining installations being 'a mining work anchored in or present above the soil of surface water'.

67 'Ontwerp- Beleidsnota Noordzee 2016–2021', 5 (Dutch). This policy document is an appendix to the 'Ontwerp Nationaal Waterplan 2016–2021' and was presented to Dutch parliament in December 2014, see: Kamerstukken II 2014/15, 31 710, number 35 (Dutch).

68 Section 2.3. (this article). M.M. Roggenkamp 'Energy Law in the Netherlands' (n 61).

69 EBN c.s., 'Netherlands masterplan for decommissioning and re-use', 2017. See https://kennisbank.ebn.nl/masterplan-decommissioning-and-re-use/.

70 Mining Decree (n 57), art 60(1).

71 Mining Decree (n 57), art 61(1)(a), (1)(c).

72 Mining Decree (n 57), art 61(1)(d).

73 Mining Decree (n 57), art 61(2).

74 Mining Decree (n 57), art 60(2).

75 Mining Decree (n 57), art 60(3).

76 MA 2003 (n 56), art 44(4).

77 MA 2003 (n 56), arts 47(2) in combination with art 41(4). If there is more than one party to the licence, the operator will be responsible instead: TK 1998–1999, 26 219, number 3, 27.

78 TK 1998–1999, 26 219, number 3, 27. According to the MEA, the same provision could create an opportunity for postponement of removal if the platform is not used anymore for production processes, but is still a link in the transportation system. This appears to be relevant if multiple fields share their infrastructure and there is/are still some producing field(s).

Following the main principles of international law, offshore pipelines will usually remain in place unless the MEA prescribes such removal.[79] A decision to remove unused pipelines will be made on the basis of comparing the costs and benefits for society with the environmental consequences and safety issues.[80] If a pipeline remains in situ, the MEA may require that the pipeline meets certain requirements as regards its condition[81] and that the operator will regularly inspect the abandoned pipeline.[82] This provision seems rather contradictory as it can be assumed that the company operating a pipeline will terminate its activities when the pipeline is being disused. It is therefore not surprising that this provision will be reassessed.[83]

It follows from the above that by contrast to submarine pipelines, unused installations have to be completely removed on the basis of an abandonment and removal plan that has to be approved by the MEA. Such approval can only be rejected if the plan would result in dangerous situations. If not being rejected on those grounds, the Minister has to grant its approval and is not entitled to deviate from the plan submitted by the operator. Hence, the MEA is not in the position to facilitate that an unused and abandoned installations remains in place if a licensee/operators submits a removal plan and initiates a removal of an unused installation within a specific time frame, the MEA is neither entitled to reject the plan in order to facilitate future CO_2 storage. Hence, the legal framework does not really facilitate re-use of installations.

However, the approach towards re-use of installations is gradually changing since EBN jointly with the organisations representing the oil and gas operators (NOGEPA) and service industry (IRO) presented in November 2016 a Masterplan for Decommissioning & Re-use in the Netherlands. This led to the establishment of a National Platform for Re-use & Decommissioning (Nexstep). In response to the discussions on potential re-use options, the MEA is proposing an amendment of the MA to enable the re-use of offshore assets.[84]

79 MA 2003 (n 56), arts 49(1),(5) with reference to Mining Decree (n 57), art 103. In case the MEA has commanded removal of an offshore pipeline, the same regime as regards the removal of offshore installations will apply: MA 2003 (n 56), art 45(1).

80 'Ontwerp- Beleidsnota Noordzee 2016–2021' (n 65), 35.

81 MA 2003 (n 56), arts 49(1),(5) with reference to Mining Decree (n 57), art 104(2).

82 MA 2003 (n 56), arts 49(1),(5) with reference to Mining Decree (n 57), art 104(3). If necessary, the MEA may stipulate remedial action.

83 An investigation will be carried out between 2016 and 2021 in order to establish whether it would be possible to leave the pipelines in situ without inspection, whether the duty of inspection should be transferred to the government or to consider the possibility of removing the pipeline. See 'Ontwerp- Beleidsnota Noordzee 2016–2021' (n 67), 35.

84 TK 2017–2018 (Duurzame ontwikkeling en beleid), 30196, nr. G, 2.

3.3 *The United Kingdom*

Whereas exploration for and production of oil and gas are based on licensing pursuant to the Petroleum Act 1998 (PA 1998) as amended, permits to store carbon dioxide are governed by the 2008 Energy Act.[85] By contrast to the oil and gas exploration and production licensing regime on the UK continental shelf, section 18(3) of the 2008 Energy Act also requires a lease from the Crown Estate for storing CO_2 offshore.[86] An offshore hydrocarbons licence covers all phases of the development, i.e. exploratory drilling, appraisal and production, but is split into three terms and may last for approximately 25 to 30 years. The licence may be awarded upon condition that the licensee provides for financial security[87] by way of a trust or other arrangements.[88] The licence is usually awarded to an unincorporated joint venture who appoint amongst themselves an operator.[89] By contrast to the Netherlands (and Norway) the State does not participate.

The CS of the United Kingdom (UKCS) comprises (mostly) of deep waters and although it is presumed that unused installations have to be entirely removed, the PA 1998, consistent with OSPAR Decision 98/3, allows for the possibility of partial removal.[90] Rules regarding abandonment and removal can be found in the PA 1998, which provides that the Secretary of State (SoS) may require the submission of an abandonment programme for the abandonment of an offshore installation[91] or a submarine pipeline.[92] The power in the hands

85 Energy Act 2008, c 32. 'An Act to make provision relating to gas importation and storage' (.....) <www.legislation.gov.uk/ukpga/2008/32/contents> accessed 13 October 2015. See: A. McHarg and M. Poustie, 'Risk, Regulation, and Carbon Capture and Storage: The United Kingdom Experience' in D.N. Zillman and others (eds), *The Law of Energy Underground: Understanding New Developments in Subsurface Production, Transmission, and Storage* (Oxford University Press 2014) 250.

86 See also EnA2008, Explanatory Notes, para 55.

87 PA 1998 (n 59), ss 38A, 38B.

88 PA 1998 (n 59), s 38A(1).

89 G. Gordon, A. McHarg and J. Paterson 'Energy Law in the United Kingdom' in M.M. Roggenkamp and others (eds), *Energy Law in Europe. National, EU and International Regulation* (Oxford University Press forthcoming 2016).

90 PA 1998 (n 59), s 29(4)(c).

91 Offshore installation means any installation which is or has been maintained, or is intended to be established, for the carrying on of – inter alia – the exploitation of mineral resources in or under the shore or bed of relevant waters. (PA 1998 (n 59), ss 45, 44(1)- 44(4)). Relevant waters include the Continental Shelf of the UK (PA 1998 (n 59), s 44(4)(b) PA 1998 (n 59), Continental Shelf Act 1964, s 1(7) and the Continental Shelf (Designation of Areas) Order 2013).

92 Submarine pipeline means a pipeline, i.e. a pipe or system of pipes (excluding a drain or sewer) for the conveyance of anything, together with all apparatus, works and services associated with its operation, which is (or is intended to be established) in, under or over

of the Secretary of State to make regulations for decommissioning[93] have not been used, but Guidance Notes have been issued and regularly updated by the relevant Department[94] and it is by means of these that the UK specifies in detail how it will go about implementing its obligations under international law with regard to decommissioning.[95] Usually the abandonment programme will be submitted to the SoS by the operator, but the SoS may serve a notice requiring submission of such a programme might to a wide range of parties.[96] In case of any unused pipelines, a notice can only be served upon the owner of the pipeline, any person who owns a significant interest in the pipeline or associated companies with this person.[97] An abandonment programme will be subjected to a stakeholder consultation process[98] and shall in any case contain an estimate of the costs of the measures proposed in it and shall either specify the times at/within the proposed measures are to be taken or shall make provision as to determine these times.[99]

The SoS may reject the programme or approve it conditionally or unconditionally. If an abandonment programme has been approved by the SoS, the person who has submitted the programme has to secure that it will be carried out and that any abandonment and/or removal conditions are complied with.[100] This implies that the operator – who will in most cases be the designated person[101] – will be responsible for the monitoring and the maintenance

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waters in the territorial sea and the CS. (PA 1998, ss 45 and 26(1), Continental Shelf Act 1964, s 1(7), and the Continental Shelf (Designation of Areas) Order 2013).

PA 1998 (n 59), s 29(1).

Even though the Act refers to an abandonment programme, the preferred and generally accepted term is decommissioning programme: DECC Guidance Notes (n 58), para 2.1.

93 PA 1998 (n 59), s39.

94 Currently the Department for Business, Energy and Industrial Strategy (commonly referred to by the abbreviation BEIS).

95 The most recent Guidance Notes were issued in November 2018 and are available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/760560/Decom_Guidance_Notes_November_2018.pdf.

96 PA 1998 (n 59), ss 29,30. Also: G. Gordon, A. McHarg and J. Paterson 'Energy Law in the United Kingdom' in M.M. Roggenkamp and others (eds), *Energy Law in Europe. National, EU and International Regulation,* 3d edition, Oxford University Press, 2016.

97 PA 1998 (n 59), ss 29, 30.

98 See G. Gordon, A. McHarg and J. Paterson 'Energy Law in the United Kingdom' in M.M. Roggenkamp and others (eds), *Energy Law in Europe. National, EU and International Regulation.* 3d. edition, Oxford University Press, 2016.

99 PA 1998 (n 59) 9.

100 PA 1998 (n 59), s 36.

101 PA 1998 (n 59), ss 29, 30.

activities that are being part of the programme. Consequently, the operator will also bear the costs associated with these activities.

In the event of non-compliance, the SoS may serve a default notice. Failure to comply may give rise to criminal penalties and will permit the SoS to undertake any remedial action necessary, at the defaulting party's expense.[102] In case the designated person is no longer able to carry out the approved abandonment programme, the SoS may decide to instruct another company to carry out the work instead.[103] However, only companies that were previously in receipt of a notice or persons on whom notices could have been served are eligible to take over responsibilities.[104] One has to note that this competence should only be used as a measure of last resort.[105] Moreover, the SoS may in some few instances have the power to prepare an abandonment plan itself, for example if an abandonment plan is rejected or a notice to submit an abandonment programme has not been complied with.[106] In such a case, the SoS shall inform the persons to whom notice was given in the first place of the terms of the abandonment programme.[107]

About 500 installations and 3000 pipelines are placed on the UKCS. In 2017 just 7% of this infrastructure has been decommissioned. However, the rate of decommissioning is expected to accelerate rapidly in the years ahead.[108] When considering the possible re-use of installations, it is important to note that the UK government recognizes that disused facilities – including pipelines – may represent important infrastructure for its CS and therefore should provide the means for new developments such as geological storage of carbon dioxide.[109] If a specific opportunity for re-use has been identified, a deferral of the duty of abandonment might be considered.[110] In that case the proposed abandonment programme should include detailed provisions as to any continuing use and maintenance of the installation.[111] Moreover, the operator is required to

102 PA 1998 (n 59), s 37.
103 PA 1998 (n 59), s 34(1)(b). DECC Guidance Notes (n 60), para 16.1.
104 PA 1998 (n 59), s 34(2). DECC Guidance Notes (n 60), para 16.1.
105 DECC Guidance Notes (n 60), para 16.1.
106 PA 1998 (n 59), s 33(1).
107 PA 1998 (n 59), s 33(7). In that case, the provisions of PA 1998 (n 59), part IV shall have effect as if the abandonment programme had been submitted by the notified persons and approved by the SoS.
108 Bureau Veritas, Decommissioning on the UK Continental Shelf – an overview of regulations, May 2017.
109 DECC Guidance Notes (n 60), para 5.18.
110 DECC Guidance Notes (n 60), para 5.18.
111 PA 1998 (n 59), s 29(4)(c).

implement arrangements for monitoring, maintenance and management of the decommissioned site and any remaining parts of the offshore infrastructure.[112]

The question of reuse is now more acute since the arrival of the Oil and Gas Authority (OGA) in 2015.[113] Tasked with implementing the UK's Maximising Economic Recovery Strategy,[114] which includes a concern to avoid stranded reserves in the event that infrastructure is decommissioned prematurely, the OGA is the body to whom an operator must apply in relation to cessation of production prior to decommissioning. The OGA advises the Secretary of State on "alternatives to abandoning or decommissioning the installation or pipeline, such as reusing or preserving it" and on "how to ensure (whether by means of the timing of the measures proposed, the inclusion of provision for collaboration with other persons, or otherwise) that the cost of carrying out the (decommissioning) programme is kept to the minimum that is reasonably practicable in the circumstances".[115] It is noteworthy also that in the exercise of its functions, the OGA must have regard, inter alia, to the "The development and use of facilities for the storage of carbon dioxide, and of anything else (including, in particular, pipelines) needed in connection with the development and use of such facilities".[116]

3.4 *Norway*

The Ministry of Petroleum and Energy (MPE) is entitled to issue an exploration, production and pipeline licence on the basis of the 1996 Petroleum Act and a CO_2 storage license on the basis of a Regulation governing the storage of carbon dioxide on the Norwegian CS.[117]

112 DECC Guidance Notes (n 60), para 5.17, also 86.

113 The OGA is established as an independent Government Company by the Energy Act 2016, s1.

114 Available at: https://www.ogauthority.co.uk/media/3229/mer-uk-strategy.pdf.

115 BEIS Guidance Notes, para. 2.7.

116 Energy Act 2016, s8.

117 CO2 Storage Regulation 2014 (*Forskrift om utnyttelse av undersjøiske reservoarer på kontinentalsokkelen til lagring av CO_2 og om transport av CO_2 på kontinentalsokkelen*) implements Directive 2009/31/EC and entered into force on 20 January 2015. The Regulation is based on Act no. 12 of 21 June 1963 governing the exploitation of other offshore natural resources (*Lov om vitenskapelig utforskning og undersøkelse etter og utnyttelse av andre undersjøiske natureforekomster enn petroleumsforekomster*) The Act and the Regulation can be found at <https://lovdata.no/dokument/SF/forskrift/2014-12-05-1517>. A non-authoritative translation of the Act in English can be consulted at: www.npd.no/en/Regulations/Acts/Scientific-research-act/.

Exploration and production licenses are awarded on the basis of licensing rounds and are usually awarded to joint ventures established by the MPE. Licences are awarded for a specific period of time and the State participates via the State company Petoro in all licences.[118] The State can provide for financial security ensuring that unused installations will be removed.[119]

The Norwegian CS comprises of deep (and very deep) waters, which means that installations can be partially removed. The holder of a production licence[120] and/or a pipeline licence[121] has the duty to submit a decommissioning plan to the MPE.[122] The obligation to submit a decommissioning plan depends upon two main events: the permanent disuse of the installations or the expiration of the licence, whichever event occurs first.[123] The decommissioning plan has to either include a proposal for continued production or a proposal for shutdown of production and disposal of facilities. Disposal may, inter alia, constitute other uses or partial (or complete) removal.[124] As a general rule, pipelines may be left in place when they do not obstruct, or present a safety risk for fishing.[125]

More detailed provisions are provided in the PR 1997, which state that the decommissioning plan shall consist of two parts: a disposal plan describing the disposal alternatives and an impact assessment.[126] The disposal plan has to present all disposal alternatives relevant to the specific case, which may range from complete or partial removal to continued use for other purposes. The latter also includes the mere abandonment of an installation in combination with continued maintenance and inspections.[127] The licensee has to describe the technical, safety, environmental and economic aspects and the relationship to other users of the sea for each alternative and has to recommend one of them.[128] The MPE will select one of the alternatives presented by the licensee – which is

118 F. Arnesen and others, 'Energy Law in Norway' in M.M. Roggenkamp and others (eds), *Energy Law in Europe. National, EU and International Regulation*, 3rd edition, Oxford University Press, 2016.
119 PA 1996 (n 61), ss 1–4, 1–6(l).
120 PA 1996 (n 61), s 3–3.
121 PA 1996 (n 61), s 4–3. Also: Arnesen and others (n 107).
122 PA 1996 (n 61), s 5–1. The MPE may waive the requirement to submit a decommissioning plan.
123 PA 1996 (n 61), s 5–1.
124 PA 1996 (n 61), s 5–1.
125 Arnesen and others (n 118).
126 PR 1997 (n 61), s 43.
127 Arnesen and others (n 118).
128 PR 1997 (n 61), s 44.

not necessarily the recommended one – and decides accordingly.[129] About 500 installations are placed on the Norwegian CS. In 2018, around 20 decommissioning plans have been processed and approved by the authorities. In most instances the final decision has been to partially remove disused facilities and transport them to shore.[130]

In case the MPE agrees that an unused installation should be abandoned but not removed, the licensee or owner will be liable for any damages or inconveniences caused wilfully or inadvertently in connection with the abandoned facility, unless the MPE decides otherwise.[131] The PA 1996 also provides for a situation that the licensees/owners and the State conclude an agreement as a result of which the maintenance, responsibility and liability will be taken over by the State on the basis of an agreed financial compensation.[132] The State may also take over a fixed facility when its use has been terminated permanently or when a licence is expired, surrendered or revoked.[133] This possibility has to be regarded in view of the Norwegian government's aim to continue the use of reservoirs and the installations, which are considered beneficial for the government.[134]

3.5 *Approaches in the North Sea Area*

It follows from the above that the approach taken in Norway and the UK differs from the approach in the Netherlands. This is partly due to the fact that the installations on the Dutch continental shelf are situated in shallow waters and thus subject to a requirement of complete removal. In Norway and the UK decisions regarding the removal of unused installations are based on a case-by-case approach and will usually result in a decision to partially remove the installation. More important, however, is the fact that currently the Dutch MEA has no discretionary powers when assessing an abandonment plan. This contradicts with the Norwegian and UK approaches that facilitate future uses of offshore infrastructure. However, all three countries have identified re-use

129 PA 1996 (n 61), s 5–3. According to Arnesen and others, this provision leaves a very wide margin of discretion to the MPE: Arnesen and others (n 118).

130 Norwegian Ministry of Petroleum and Energy and Norwegian Petroleum Directorate, <http://npd.no/en/Publications/Facts/>.

131 PA 1996 (61), s 5–4. Civil liability will exist as long as the installation is physically able to cause damage, there is no preclusion in this respect: H.J. Bull and K. Kaasen, 'Abandonment and Reclamation of Energy Sites and Facilities: Norway' [1992] Journal of Energy and Natural Resources 37, 45.

132 PA 1996 (n 61), s 5–4.

133 PA 1996 (n 61), s 5–6.

134 Roggenkamp 'Juridisch kader' (n 41) 504–505.

as an important issue that may affect abandonment and decommissioning policies.

4 Challenges and Possible Solutions with regard to the Re-use of Installations

4.1 *Introduction*

In the above we have examined how international law and national laws regulate the abandonment and removal of installations that have been used to produce oil and/or gas from fields situated on the CS. Now we will discuss in more detail the possible re-use of depleted oil and gas fields for permanently storing CO_2 and how this may have an impact on the abandonment and removal obligations. Given our focus on the re-use of reservoirs and related infrastructure, we will not discuss CO_2 storage in offshore aquifers despite its potential for large-scale storage.

When examining the re-use of depleted offshore oil/gas fields for the purpose of CO_2 storage we distinguish between several scenarios. First, we will discuss the option that the holder of a hydrocarbons production licence wishes to re-use the reservoir for CO_2 storage. Thereafter we will discuss the possibility that the holder of the production licence is not interested in such a development and wants to terminate its activities and abandon the installations. To which extent can the national authorities intervene and decide that the installations will not be removed? Who will in such a scenario be responsible for the installation, its maintenance and future removal?

4.2 *Re-use by an Existing Licensee*

Re-use by an existing holder of a production license is the most straightforward option. In such a scenario the competent authority will probably not require an exploration permit as sufficient information is available following the hydrocarbons production activities. It is therefore most likely that the licensee can apply directly for a CO_2 storage permit. However, following the CO_2 Storage Directive sus a permit has to be awarded in competition. This means that the application will be assessed on the basis of its technical and financial merits. If the applicant is financially sound the assessment will mainly focus on the technical capability of the applicant. Given the knowledge of the reservoir following the prior production activities it can be assumed that this particular applicant will be awarded the storage permit. This will become even more

likely if the holder of the production license has made use of the possibility to inject CO_2 for the purpose of enhanced hydrocarbons recovery.

Another issue involves the abandonment and removal plan. What is the status of this plan if the holder of the production licence will be awarded the storage licence? As the UK and the Norwegian authorities are aiming at facilitating future uses of existing infrastructure, the holder of a production license under UK and Norwegian law may submit an abandonment plan that takes future use into account. Although not explicitly stated under Dutch law, it seems that such an approach would be possible as well. The abandonment and removal plan should then clearly explain the situation and how removal will be dealt with in the future. Although the MEA still has the right to set a time limit for removal it is not very likely that he will do so if a storage permit has been awarded or is pending. Moreover, under current Dutch law there is no time frame within which an abandonment and removal plan has to be submitted. As a consequence the licensee and the MEA may agree to postpone submission of such a plan.

Turning a production into a storage facility will also have some financial consequences. A joint venture holding a production licence will usually have made some arrangements in the Joint Operating Agreement with regard to abandonment costs. The government will be keen to ensure that any financial arrangements involving removal costs will be transferred to the new licensee. In case not all companies of the joint venture will be part of the storage venture, it may be necessary to rely on provisions that normally are included in farm-in and farm-out agreements. Similarly account has to be taken of the State participant. If a State participates in the production of hydrocarbons it will also be responsible of paying a share of all costs, including abandonment costs. However, if the State is not participating in the storage activities arrangements have to be made with regard to the postponed payment of any removal costs. Given the more stringent abandonment provisions in the CO_2 Storage Directive it is likely that the costs of abandonment and removal will be higher in the future. In order to avoid disputes about the payment of removal costs in the future, it seems necessary that all parties involved ensure that there is a clear understanding of future obligations.

4.3 *Re-use by Another Party*

It is possible that the holder of a production license is not interested in re-using the reservoir and the existing installations for storing CO_2 in the depleted reservoir. It is, nevertheless, possible that the government is of the opinion that the reservoir is suitable as a storage site. After the area has been returned to the

government, all interested parties can apply for a storage permit. Depending on the national regimes, such a permit can be awarded on the basis of a permitting round or via an open door approach, i.e. inviting others to submit a competitive application after an application has been made.

As in the above scenario, it will be necessary to consider the procedures regarding the requirement to submit an abandonment and removal plan. What happens if the government wishes to re-use the field and related installations but the holder of a production plans submits an abandonment and removal plan aiming at a complete or partial removal of the installations and closure of the field? In case an abandonment and removal plan has been submitted, the Dutch MEA cannot intervene and can only refuse to give his consent in case of risks of potential damages. As the MA does not provide for a clear time line for submitting abandonment and removal plans, the only solution seems to be that the MEA and holder of the production license enter into a prior agreement on the approach towards the abandonment and removal and the payment of costs involved. The UK and Norway seem to have a different approach. If in the UK a specific opportunity has been identified, the SoS may consider a deferral of the duty of abandonment and removal.[135] Norwegian law opens up for the possibility that the State will take-over the installation if a licence has been expired.[136]

4.4 *Future Re-use of Depleted Fields*

A third scenario involves the situation that depleted fields are suitable for CO_2 storage but no parties can be found to apply for a storage permit or the use of one or more depleted fields for storage purposes only will materialise on the longer term, for example, due to the need to cluster several fields in order to develop transport facilities and/or to make it economically viable. Such a scenario requires that the State will be actively involved in order to avoid that fields are closed down and installations removed but also that the State will be able to ensure that the period between the cessation of the production activities and/or the termination of the production licence and the commencement of CO_2 storage on the longer term will be bridged in terms of monitoring and maintenance of the fields and the existing infrastructure.[137]

135 See above section 3.3.

136 See above section 3.4.

137 Also: M.M. Roggenkamp 'Regulating Underground Storage of CO_2' in M.M. Roggenkamp and E. Woerdman (eds), *Legal Design of Carbon Capture and Storage. Developments in the Netherlands from an International and EU Perspective* (Intersentia 2009) 225.

As discussed above, international law requires States to ensure that unused installations are removed but does not provide for clear guidance as to the timing of removal. Consequently, States have to ensure that no installations become 'orphans' as a result of which there are no funds available for abandonment and removal in the future. In the absence of a licensee to maintain unused infrastructure, it is easy to point to the State as the party responsible for keeping the infrastructure in place. This follows from international law and is also the approach taken by Norway. However, who or what is the State? The State itself is not conducting such activities and will have to appoint a person or entity that will be able to take care of the abandoned infrastructure on its behalf. This could be a State oil and gas company but in the North Sea area the previous State oil and gas companies have been mostly privatised and any State participation is currently restricted to a financial participation. It is therefore not very likely that State participants like EBN and Petoro will be charged with the task to keep installations in place for future re-use. Apart from a financial participation the State is also involved as an independent health and safety authority. However, being able to supervise exploration and production activities and check whether or not installations are maintained and safe does not put these authorities into a position as a temporary operator. It therefore is most likely that the State has to appoint an oil and gas producing company to maintain these installations on its behalf as a temporary operator since these companies have the necessary expertise and technical skills.

Which company can be appointed or act as a temporary operator and how could this be arranged? In the absence of a State oil and gas company, a possible solution would be to appoint an 'operator of last resort' in order to take care of the abandoned installations on behalf of the State until a storage permit has been awarded. This 'operator of last resort' would be somewhat comparable to the 'supplier of last resort' in the downstream energy sector, i.e. a situation where an energy company is taking over the supply of energy to household consumers in a case where another supplier fails to deliver due to a bankruptcy or withdrawal of a licence.[138] The appointment of an 'operator of last resort' should be based on a competitive regime or based on a prior selection of companies active on the CS of the coastal States involved. Such a temporary operator or an 'operator of last resort' will be responsible for maintaining the

138 Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC [2009] OJ L211/94, art 3(3).

infrastructure and transfer the operations and responsibility to the holder of the CO_2 storage permit as soon as it has been awarded.[139]

The appointment of an 'operator of last resort' has several consequences. As regards the abandonment obligations it can be assumed that the operator as a temporary operator will not be interested to take the full abandonment obligation without further arrangements. Hence, either the abandonment and removal obligations resting on the holder of the (previous) production licence will be transferred temporarily to the State or to the 'operator of last resort' until a CO_2 storage permit has been granted. Such transfer needs to be accompanied with all financial consequences as apply in any transfer of a licence. The holder of the (previous) production license will thus not be relieved from paying abandonment and removal costs and the 'operator of last resort' will not be charged with abandonment and removal costs, which is fair as this temporary operator of the installation will not have any income or profits from the position it has achieved. In order to act as a temporary operator and depending on the applicable tax regimes it may be necessary to consider some tax exemptions for 'operators of last resort'. Moreover, it may also be necessary to consider some financial incentives to compensate the 'operators of last resort' for their efforts. The easiest and most straightforward solution would be to require the State to pay the operator of last resort a fair compensation. Such financial compensation could potentially be considered as a State aid. However, such compensation could escape classification as a State aid if the undertaking ('operator of last resort') is selected on the basis of a tendering procedure and if it involves a service in the general interest (public service obligation), the compensation is established in a transparent way and does not exceed what is necessary to cover the costs incurred and neither gives the recipient undertaking an advantage over competing undertakings.[140] These criteria seem to apply to the 'operator of last resort' if the undertaking is selected via a transparent tendering procedure and the compensation is limited to actual costs made for maintenance. Moreover, the re-use of installations would be in the general interest as it is the State who is subject to international and EU obligations regarding CO_2 greenhouse gas emissions reduction and as such has an interest keeping these installations in place for re-use on the long(er) term.

139 M.M. Roggenkamp 'Regulating Underground Storage of CO_2' (n 137) 225.

140 Cf. the criteria developed in the Altmark Trans case (C-280/00).

5 Concluding Remarks

CCS is being perceived as a possibility for governments to mitigate climate change and to be able to fulfil the still increasing demands for fossil fuels at the same time, by way of storing CO_2. The purpose of this chapter was to investigate – from a legal perspective – how to enhance the deployment of CO_2 storage in (nearly) depleted oil and gas fields in the North Sea area. The chapter focuses in particular on legal aspects governing the reuse of existing but redundant infrastructure on the seabed of the continental shelf.

Any re-use of depleted oil and/or gas fields requires that installations are kept in place when production ceases and the reservoir is not shut down. As offshore installations potentially may obstruct other uses of the sea such as navigation and fishing, UNCLOS provides a clear obligation that unused installations have to be removed. The IMO Guidelines limit this obligation to a situation where installations are permanently disused. Moreover, neither UNCLOS nor the IMO Guidelines contain a strict time frame for removal. Coastal States may thus have more room to manoeuvre than expected at first sight. This is illustrated by the abandonment and removal plans, which are applied in the Netherlands, the UK and Norway. The regimes in the UK and Norway are rather similar as they facilitate partial removal of installations and for the possibility to keep existing infrastructure in place if relevant for future uses. In such case, the abandonment plan should contain provisions regarding continuing inspection and maintenance, for which the licensee/operator would be responsible. In Norway, the State may even decide to step in and take over responsibilities and assets. The situation in the Netherlands differs as the MA requires a complete removal after production has ceased and does not provide the MEA with any powers to amend and intervene in abandonment and removal plan after it has been submitted. The current MA does not provide any strict time frame for submitting an abandonment and removal plan and in practice a solution can be found by postponing the submission of such a plan. However, this situation may change in the near future if the proposal to amend the MA in order to facilitate re-use is accepted.

The interest in re-using unused offshore facilities is increasing in the North Sea area. However, when considering the options for re-using depleted oil and gas fields and all relevant installations for carbon storage, we note that some uncertainties exist for the transitional period between production ceases and a CO_2 storage permit is awarded. Is there a guarantee that the holder of a production license will be awarded a storage permit? If so, what kind of arrangements will be made for transferring abandonment and removal obligations to the

holder of the storage permit and how does this impact future removal? How can we ensure that fields are not abandoned and installations not removed without a storage permit has been awarded? Is it possible to provide for a temporary solution by appointing an 'operator of last resort'? These questions have been discussed in this chapter and an attempt is made to provide some answers. However, regulatory certainty can only be provided by the legislators. We therefore conclude that from a legal perspective, storage of CO_2 in depleted oil and gas fields is surrounded by some obstacles that need to be resolved. Solutions can feature on the level of international, EU and national law and may range from amending the IMO Guidelines, the CO_2 Storage Directive and national legislation. As the exploitation of oil and gas fields in the North Sea area is ageing and maturing and although first steps have been made to facilitate re-use of installations, it is time for legislators and policy makers to act and seize this window of opportunity.